7.2.1 HOMEWORK

7-94. Complete the table below and find its equation. Hints⇔Help

x	y
	1
	3
2	9
	27
4	
	243
6	
7	
8	

7-95. Margee thinks she can use logs to solve $56 = x^8$, since logs seem to make exponents disappear. Unfortunately, Margee is wrong. Explain the difference between equations like $2 = 1.04^x$, in which you can use logs, and $56 = x^8$, in which it does not make sense to use logs. Hints⇔Help

7-96. What values must x have so that $\log(x)$ is greater than 2? **Justify** your answer. Hints⇔Help

7-97. Simplify each expression below. If you are stuck, the ideas in problem 7-74 should be helpful. Hints⇔Help

a. $$\frac{x}{1-\frac{1}{x}}$$

b. $$\frac{\frac{1}{a}+\frac{1}{b}}{\frac{1}{b}-a}$$

7-98. Consider the questions below. Hints⇔Help

a. What can you multiply 8 by to get 1?
b. What can you multiply x by to get 1?
c. Using the rules of exponents, find a way to solve $m^8 = 40$. Remember that logarithms will not be useful here, but the exponent key on your calculator *will* be. (Obtain the answer as a decimal approximation

using your calculator. Check your result by raising it to the 8^{th} power.)

d. Now solve $n^6 = 300$.
e. Describe a method for solving $x^a = b$ for x with a calculator.

7-99. Adam keeps getting negative exponents and fractional exponents confused. Help him by explaining the difference between $2^{1/2}$ and 2^{-1}. Hints⇔Help

7-101. What is the equation of the line of symmetry for the graph of $y = (x - 17)^2$? **Justify** your answer. Hints⇔Help

7-102. Solve each system of equations below. Hints⇔Help

a. $-4x = z - 2y + 12$
   $y + z = 12 - x$
   $8x - 3y + 4z = 1$
b. $3x + y - 2z = 6$
   $x + 2y + z = 7$
   $6x + 2y - 4z = 12$
c. What does the solution in part (b) tell you about the graphs?

7.2.2 HOMEWORK

METHODS AND MEANINGS

MATH NOTES

Logarithm Properties

The following definitions and properties hold true for all positive $m \neq 1$.

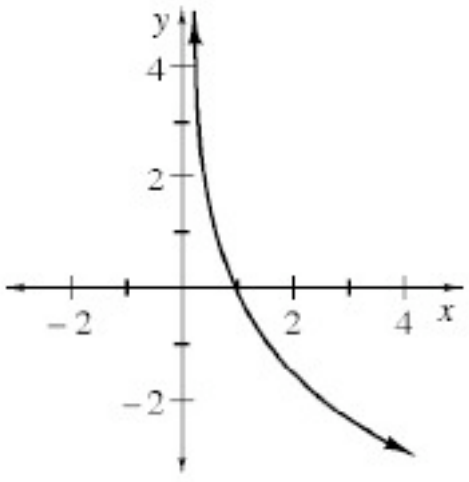
Definition of logs:	$\log_m(a) = n$ means $m^n = a$
Product Property:	$\log_m(a \cdot b) = \log_m(a) + \log_m(b)$
Quotient Property:	$\log_m(\frac{a}{b}) = \log_m(a) - \log_m(b)$
Power Property:	$\log_m(an) = n - \log_m(a)$
Inverse relationship:	$\log_m(m)^n = n$ and $m^{\log m(n)} = n$

Review & Preview

7-111. Solve each of the following equations to the nearest 0.001. Hints⇔Help

a. $(5.825)^{(x-3)} = 120$
b. $18(1.2)^{(2x-1)} = 900$

7-112. Below is a graph of $y = \log_b x$. Describe the possible values for b. Hints⇔Help



7-113. Use the definition of a logarithm to change $\log_2 7$ into a logarithmic expression of base 5. Hints⇔Help

7-114. Sketch the graph of $y = \log_3(x + 4)$ and describe the transformation from its parent graph. Hints⇔Help

7-115. The economy has worsened to the point that the merchants in downtown Hollywood cannot afford to replace their outdoor light bulbs when the bulbs burn out. On average, about thirteen percent of the light bulbs burn out every month. Assuming there are now about one million outside store lights in Hollywood, how long will it take until there are only 100,000 bulbs lit? Until there is only one bulb lit? Hints⇔Help

7-116. Raymond, Hannah, Aidan, and Sarah were working together to change $y = 3x^2 - 15x - 5$ into graphing form. They started by rewriting it as $y = 3(x^2 - 5x) - 5$, when Raymond said,

"*Will this one work? Look, the perfect square would have to be* $(x - 2.5)^2$.

After thinking about it for a while, Sarah said, "*that's OK. Negative* 2.5 *squared is* 6.25*, but because of the 3 we factored out, we are really adding* 3(6.25)."

"*Yes,*" Aidan added, "*So we have to subtract* 18.75 *to get an equivalent equation*."

Hannah summarized with the work shown below. What do you think? Did they rewrite the equation correctly? If so, find the vertex and the line of symmetry of the parabola. If not, explain their mistakes and show them how to do it correctly. Hints⇔Help

$$y = 3x^2 - 15x - 5$$
$$y = 3(x^2 - 5x) - 5$$
$$y = 3(x - 2.5)^2 - 5 - 18.75$$
$$y = 3(x - 2.5)^2 - 23.75$$

7-117. Use the ideas developed in problem 7-116 to change each of the following quadratic equations into graphing form. Identify the vertex and the line of symmetry for each one. Hints⇔Help

a. $f(x) = 4x^2 - 12x + 6$
b. $g(x) = 2x^2 + 14x + 4$

7-118. Consider the function $y = 3(x + 2)^2 - 7$ as you complete parts (a) through (c) below. Hints⇔Help

a. How could you restrict the domain to show "half" of the graph?
b. Find the equation for the inverse function for your "half" graph.
c. What are the domain and range for the inverse function?

7-119. Eniki has a sequence of numbers given by the formula $t(n) = 4(5^n)$. Hints⇔Help

a. What are the first three terms of Eniki's sequence?
b. Chelita thinks the number 312,500 is a term in Eniki's sequence. Is she correct? **Justify** your answer by either giving the term number or explaining why it is not in the sequence.
c. Elisa thinks the number 94,500 is a term in Eniki's sequence. Is she correct? Explain.

7-120. Solve each of the following equations. Hints⇔Help

a. $\frac{x}{3} = x + 4$

b. $\frac{x+6}{3} = x$

c. $\frac{x+6}{x} = x$

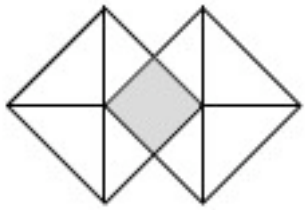
d. $\frac{2x+3}{6} + \frac{1}{2} = \frac{x}{2}$

7-121. Which of the following statements are true? If true, explain how you know, and if not, show why not. Hints⇔Help

a. $\frac{x+3}{5} = \frac{x}{5} + \frac{3}{5}$

b. $\frac{5}{x+3} = \frac{5}{x} + \frac{5}{3}$

7-122. Two congruent overlapping squares are shown below. If a point inside the figure is chosen at random, what is the probability that it will *not* be in the shaded region? Hints⇔Help



7.2.3 HOMEWORK

7-127. Ryan has the chickenpox! He was told that the number of pockmarks on his body would grow exponentially until his body overcomes the illness. He found that he had 60 pockmarks on November 1, and by November 3 the number had grown to 135. To find out when the first pockmark appeared, he will need to find the exponential function that will model the number of pockmarks based on the day. Hints⇔Help

a. Ryan decides to find the exponential function that passes through the points (3, 135) and (1, 60). Use these points to write the equation of his function of the form $f(x) = ab^x$.
b. According to your model, what day did Ryan get his first chickenpox pockmark?

7-128. Give an example of an equation that requires the use of logarithms to solve it. Hints⇔Help

7-129. Write three different, but equivalent, expressions for each of the following logs. For example: $\log(7^{3/2})$ can be written as $\frac{3}{2}\log(7)$, $\frac{1}{2}\log(7^3)$, $3\log(\sqrt{7})$, etc. Hints⇔Help

a. $\log(8^{2/3})$
b. $-2\log(5)$
c. $\log(na)^{bo}$

7-130. Kendra just made a cup of hot chocolate that was too hot for her to drink. She set it aside so it could cool off. While she was waiting, her friend Lara called and Kendra forgot about her hot chocolate. Sketch a graph that shows the temperature of the hot chocolate since Kendra first set it aside. How cold will the hot chocolate get? Hints⇔Help

7-131. Simplify the following fractions. Hints⇔Help

a. $\dfrac{\frac{1}{a}-\frac{1}{b}}{\frac{1}{a}+\frac{1}{b}}$

b. $\dfrac{x+y}{\frac{1}{x}+\frac{1}{y}}$

7-132. Use $f(x)=3+\sqrt{2x-1}$ to complete parts (a) through (e) below. Hints⇔Help

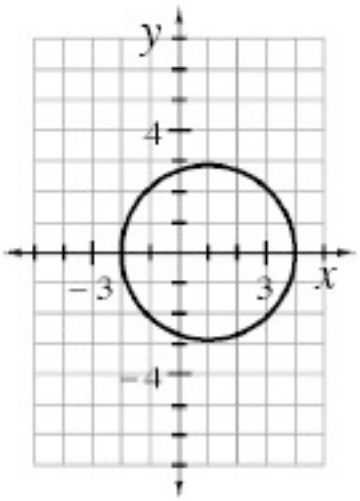
a. What are the domain and range of *f(x)*?
b. What is the inverse of *f(x)*? Call it *g(x)*.
c. What are the domain and range of *g(x)*?
d. Find an expression for *f(g(x))*.
e. Find an expression for *g(f(x))*. What do you notice? Why does this happen?

7-133. Solve each of the following equations for x. Hints⇔Help

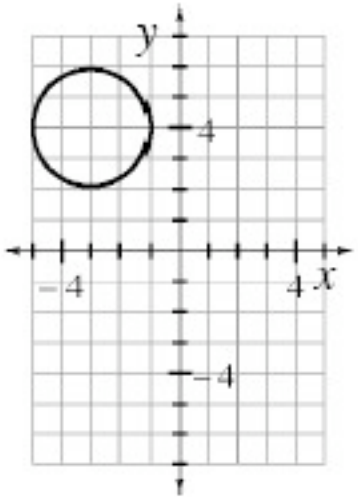
a. $x^3 = 243$
b. $3^x = 243$

7-134. Write the equation of each circle graphed below. Hints⇔Help

a.



b.



7-135. Add or subtract each expression below. Be sure to simplify. Hints⇔Help

a. $\frac{x^2}{x-5} - \frac{25}{x-5}$

b. $\frac{a^2}{a+5} + \frac{10a+25}{a+5}$

c. $\frac{x^2}{x-y} - \frac{2xy-y^2}{x-y}$

d. $\frac{x}{x+1} + \frac{1}{x-1}$

7-136. If $f(x) = x^4$ and $g(x) = 3(x + 2)$, find the value of each expression below. Hints⇔Help

a. $f(2)$
b. $g(2)$
c. $f(g(2))$
d. $g(f(2))$
e. Are $f(x)$ and $g(x)$ inverses of each other? **Justify** your answer.